Our ref: KON-1838 Client's ref: P6284-001-0000

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

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| In re Application of: W. ISHIKAWA | : | Art Unit: 2861 |
| Serial No. : 10/726,742 | : | |
| Filed : December 3, 2003 | : | Examiner: J. M. Lebron |
| Title : IMAGE FORMING METHOD, PRINTED MATTER AND IMAGE RECORDING APPARATUS | : | |

**DECLARATION**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

S i r:

I, Wataru Ishikawa, hereby declare and say as follows:

1. I am the inventor of the invention claimed in this application.

2. I received a Master's degree in Technology from Osaka University in March 1991. Since April 1991, I have been employed by Konica Corporation (now Konica Minolta Medical & Graphic). During my employment at Konica, I have engaged in research and development in the filed of silver halide photographic light-sensitive materials and ink-jet recording materials.

3. I am aware that this application has been rejected based on Kerry (US 5,428,350), Yonekubo (US 6,331,040) and Wu (US 6,467,897). Tests have been performed and are reported herein to demonstrate that unexpected results are obtained when printing using a radical polymerization ink in an image forming apparatus having a quiescent period between the expansion pulse and the shrinkage pulse compared to the teachings of the cited references. Tests have also been performed and are reported herein to demonstrate that unexpected results are obtained when printing using a cationic polymerization ink in an image forming apparatus having a quiescent period between the expansion pulse and the shrinkage pulse compared to the teachings of the cited references. These tests were performed by myself or under my direct supervision and control.

4. Comparative Ink 1, Inventive Ink 2, Inventive Ink 3 and Inventive Ink 4 were prepared and used to form images as described in Example 1 on pages 71-84 of this application. As shown in Table 1 on page 72 of this application, Comparative Ink 1 is not within the scope of the claimed invention since Comparative Ink 1 does not include a radical polymerization monomer, a radical initiator, a cationic polymerization monomer or an acid generating agent. Table 2 on page 73 shows that Inventive Ink 2 is within the scope of claim 1, since Inventive Ink 2 contains a radical polymerization compound and a radical initiator. Table 3 on page 73 shows that Inventive Ink 3 is within the scope of claim 2, since Inventive Ink 3 contains a cationic polymerization monomer (oxetane compound) and an acid generating agent. Table 4 on page 74 shows that Inventive Ink 4 is also within the scope of claim 2, since Inventive Ink 4 contains a cationic polymerization monomer (oxetane compound) and an acid generating agent.

5. In order to form ink-jet images using the prepared inks, I employed two different ink-jet recording methods. Inventive driving control method 1 was employed as described on the bottom of page 76 to page 78, par. 1 of this application. Inventive driving control method 1 is

within the scope of claims 1 and 2 since it has quiescent period W4b between expansion pulse W4a and shrinkage pulse W4c as illustrated in Figure 8 of this application. was employed as described on page 78, par. 2 of this application. Comparative driving control method 2 is not within the scope of claims 1 and 2 since it does not have a quiescent period between expansion pulse W2a and shrinkage pulse W2b as illustrated in Figure 12 of this application.

6. As shown in Table 5 of this Declaration which is identical to Table 5 on page 80 of this application, ink-jet images 1-3 were formed using Comparative Ink 1 and Inventive driving control method 1 as described in pars. 2 and 4 on page 78 of this application. Ink-jet images 4-6 were formed similar to ink-jet images 1-3, except that Comparative Ink 1 was replaced by Inventive Ink 2. Ink-jet images 7-9 were formed similar to ink-jet images 1-3, except that Comparative Ink 1 was replaced by Inventive Ink 3. Ink-jet images 10-12 were formed similar to ink-jet images 1-3, except that Comparative Ink 1 was replaced by Inventive Ink 4.

7. Table 5 of this Declaration and Table 5 on page 80 of this application also show that ink-jet images 13-15 were formed

similar to ink-jet images 1-3, except that Comparative Ink 1 was replaced by Inventive Ink 4 and Inventive driving control method 1 was replaced by Comparative driving control method 2. Ink-jet images 16-18 were formed similar to ink-jet images 1-3, except that Inventive driving control method 1 was replaced by Comparative driving control method 2.

8. As shown in Table A of this Declaration, ink-jet images 101-103 were formed similar to ink-jet images 1-3, except that Comparative Ink 1 was replaced by Inventive Ink 2 and Inventive driving control method 1 was replaced by Comparative driving control method 2.

9. Ink-jet images 1-18 and 101-103 were evaluated for text quality, color mixing and creasing/curling using the evaluation methods described on page 81, line 10 to page 83, line 13 of this application. The evaluation results for ink-jet images 1-18 are illustrated in the attached Table 6 which is identical to Table 6 on page 84 of this application. The evaluation results for ink-jet images 101-103 are illustrated in the attached Table B.

10. As shown in Table 6, ink-jet images 1-3 formed using Comparative Ink 1 and Inventive driving control method 1 and ink-jet images 16-18 formed using Comparative Ink 1 and Comparative driving control method 2 received mostly C and D ratings for text quality, color mixing and creasing/curling after continuous ejection for 1, 10 and 100 meters. By comparing ink-jet images 1-3 with ink-jet images 16-18, it is shown that a driving control method of claims 1 and 2 does not have a substantial beneficial effect on the image when an ink outside the scope of claims 1 and 2 is used.

11. As shown in Tables 6 and B, ink-jet images 101-103 formed using Inventive Ink 2 (claim 1) and Comparative driving control method 2 received mostly C and D ratings for text quality, color mixing and creasing/curling after continuous ejection for 1, 10 and 100 meters. In contrast, ink-jet images 4-6 formed using Inventive Ink 2 (claim 1) and Inventive driving control method 1 (claim 1) received mostly B and C ratings. By comparing ink-jet images 101-103 with ink-jet images 4-6, it is shown that the driving control method of claim 1 has a substantial beneficial effect on the image when an ink of claim 1 is used.

12. As shown in Table 6, ink-jet images 13-15 formed using Inventive Ink 4 (claim 2) and Comparative driving control method 2 received mostly C ratings for text quality, color mixing and creasing/curling after continuous ejection for 1, 10 and 100 meters. In contrast, ink-jet images 10-12 formed using Inventive Ink 4 (claim 2) and Inventive driving control method 1 (claim 2) received mostly B ratings. By comparing ink-jet images 13-15 with ink-jet images 10-12, it is shown that the driving control method of claim 2 has a substantial beneficial effect on the image when an ink of claim 2 is used.

13. I believe that the results shown in Tables 6 and B are surprising and unexpected, since the cited references do not teach or suggest that a superior image is formed only when an ink of the claimed invention is employed in combination with a driving control method of the claimed invention.

It is declared by undersigned that all statements made herein of undersigned's own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by

fine or imprisonment, or both, under section 1001 of Title 18 of the U.S. Code; and that such willful false statements may jeopardize the validity of this Application or any patent issuing thereon.

Wataru Ishikawa

Wataru Ishikawa

Dated: This 20th day of January, 2006.

Attached: Table 5
Table A
Table 6
Table B

Table 5

| Image No. | Ink Set No. | Recording Material | Driving Control Method | Radiation Condition | | | | | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Radiation Light Source | Radiation Method | | On the Recording Material Surface | | Radiation Light Source Condition | | |
| | | | | | Radiation Position | Light Source | Peak Wavelength (nm) | Maximum Illuminance ($mW/cm^2$) | Peak Wavelength (nm) | Energy ($mJ/cm^2$) | |
| 1 | 1 | OPP | 1 | A | *1 | *2 | 310 | 8 | 310 | 20 | Comp. |
| 2 | 1 | PET | 1 | A | *1 | *2 | 310 | 8 | 310 | 20 | Comp. |
| 3 | 1 | *3 | 1 | A | *1 | *2 | 310 | 8 | 310 | 20 | Comp. |
| 4 | 2 | OPP | 1 | A | *1 | *2 | 310 | 8 | 310 | 20 | Inv. |
| 5 | 2 | PET | 1 | A | *1 | *2 | 310 | 8 | 310 | 20 | Inv. |
| 6 | 2 | *3 | 1 | A | *1 | *2 | 310 | 8 | 310 | 20 | Inv. |
| 7 | 3 | OPP | 1 | A | *1 | *2 | 310 | 8 | 310 | 20 | Inv. |
| 8 | 3 | PET | 1 | A | *1 | *2 | 310 | 8 | 310 | 20 | Inv. |
| 9 | 3 | *3 | 1 | A | *1 | *2 | 310 | 8 | 310 | 20 | Inv. |
| 10 | 4 | OPP | 1 | A | *1 | *2 | 310 | 8 | 310 | 20 | Inv. |
| 11 | 4 | PET | 1 | A | *1 | *2 | 310 | 8 | 310 | 20 | Inv. |
| 12 | 4 | *3 | 1 | A | *1 | *2 | 310 | 8 | 310 | 20 | Inv. |
| 13 | 4 | OPP | 2 | A | *1 | *2 | 310 | 8 | 310 | 20 | Comp. |
| 14 | 4 | PET | 2 | A | *1 | *2 | 310 | 8 | 310 | 20 | Comp. |
| 15 | 4 | *3 | 2 | A | *1 | *2 | 310 | 8 | 310 | 20 | Comp. |
| 16 | 1 | OPP | 2 | A | *1 | *2 | 310 | 8 | 310 | 20 | Comp. |
| 17 | 1 | PET | 2 | A | *1 | *2 | 310 | 8 | 310 | 20 | Comp. |
| 18 | 1 | *3 | 2 | A | *1 | *2 | 310 | 8 | 310 | 20 | Comp. |

*1; Radiated from both sides of the recording head. *2; Line Light Source

*3; Bond paper Comp.; Comparative example Inv.; This invention

Table 6

| Sample No. | 1 m | | | 10 m | | | 100 m | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| | *1 | *2 | *3 | *1 | *2 | *3 | *1 | *2 | *3 | |
| 1 | C | C | D | D | C | D | D | D | D | Comp. |
| 2 | C | C | D | D | C | D | D | D | D | Comp. |
| 3 | C | C | B | D | C | B | D | D | B | Comp. |
| 4 | B | B | B | C | B | B | C | C | C | Inv. |
| 5 | B | B | B | C | B | B | C | C | C | Inv. |
| 6 | B | C | B | C | C | B | C | C | C | Inv. |
| 7 | B | B | B | B | B | B | C | B | B | Inv. |
| 8 | B | B | B | B | B | B | C | B | B | Inv. |
| 9 | B | B | B | C | B | B | C | C | B | Inv. |
| 10 | B | B | B | B | B | B | C | B | B | Inv. |
| 11 | B | B | B | B | B | B | C | B | B | Inv. |
| 12 | B | B | B | C | B | B | C | C | B | Inv. |
| 13 | B | C | B | C | C | B | D | C | B | Comp. |
| 14 | B | C | B | C | C | B | D | C | B | Comp. |
| 15 | B | C | B | C | C | B | D | D | B | Comp. |
| 16 | C | C | D | C | C | D | D | D | D | Comp. |
| 17 | C | C | D | C | C | D | D | D | D | Comp. |
| 18 | C | C | B | C | C | B | D | D | B | Comp. |

*1; Text Quality
*2; Color Mixing
*3; Creasing/curling
Comp.; Comparative Example
Inv.; This Invention

Table A

| Image No. | Ink Set No. | Recording Material | Driving Control Method | Radiation Condition | | | | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Radiation Light Source | Radiation Method | | On the Recording Material Surface | | Radiation Light Source Condition | | |
| | | | | | Radiation Position | Light Source | Peak Wavelength (nm) | Maximum Illuminance (mW/cm²) | Peak Wavelength (nm) | Energy (mJ/cm²) | |
| 101 | 2 | OPP | 2 | A | *1 | *2 | 310 | 8 | 310 | 20 | Comp. |
| 102 | 2 | PET | 2 | A | *1 | *2 | 310 | 8 | 310 | 20 | Comp. |
| 103 | 2 | *3 | 2 | A | *1 | *2 | 310 | 8 | 310 | 20 | Comp. |

*1; Radiated from both sides of the recording head. *2; Line Light Source
*3; Bond paper Comp.; Comparative example Inv.; This invention

Table B

| Sample No. | 1 m | | | 10 m | | | 100 m | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| | *1 | *2 | *3 | *1 | *2 | *3 | *1 | *2 | *3 | |
| 101 | C | C | D | C | C | D | D | D | D | Comp. |
| 102 | C | C | D | D | C | D | D | D | D | Comp. |
| 103 | C | C | B | D | C | B | D | D | B | Comp. |